

WHAT IS CLAIMED:

1. A protective packaging for protecting an at least one article, the protective packaging comprised of a shape memory foam (SMF) structure conforming to at least a portion of the at least one article for protecting the at least
5 one article wherein the SMF has a glass transition temperature (T_g).
2. The protective packaging of claim 1, wherein the SMF structure has a T_g of at or above about 21°C, the SMF structure being rigid below the T_g and elastic above the T_g , the SMF structure having a shape memory characteristic such that when the SMF structure in an original shape is deformed or
10 compressed above the T_g to produce a compressed shape and cooled in the compressed shape below the T_g , the SMF structure retains the compressed shape without the need of external forces and when the temperature is raised above the T_g , the SMF structure returns substantially to the original shape.
3. The protective packaging of claim 2, wherein the SMF
15 structure is comprised of a thermoset or thermoplastic SMF.
4. The protective packaging of claim 2, wherein the SMF structure is comprised of a structure of polyurethane foam produced by reacting an isocyanate and a polyol.
5. The protective packaging of claim 4, wherein the polyurethane
20 foam is prepared using a polyol selected from the group comprised of an aromatic polyester polyol, a polycarbonate polyol, a polyether polyol, and mixtures thereof.
6. The protective packaging of claim 5, wherein the polyol has an average functionality between about 2 and about 4.

7. The protective packaging of claim 4, wherein the isocyanate is an aromatic isocyanate having a functionality between about 2 and about 3.

8. The protective packaging of claim 4, wherein the polyurethane foam is produced by reacting the isocyanate with the polyol and a chain extender.

5 9. The protective packaging of claim 2, wherein the SMF has a substantially open cell structure.

10. The protective packaging of claim 2, wherein the T_g is less than about 21 °C.

10 11. The protective packaging of claim 2, wherein the SMF is compressible to less than about 50% of the original volume.

12. The protective packaging of claim 2, wherein the SMF further includes a natural or synthetic additive.

13. The protective packaging of claim 1, wherein the SMF structure is at least partially wrapped, coated, laminated, or encased in a film.

15 14. The protective packaging of claim 2, wherein the SMF is hydrophobic.

15. The protective packaging of claim 2, wherein the SMF is resistant to moderate levels of ionizing or non-ionizing radiation.

20 16. A method for producing a protective packaging for protecting an at least one article, the method comprising placing a shape memory foam (SMF) structure having a glass transition temperature (T_g) and an at least one article in a container, whereby the SMF conforms to at least a portion of the at least one article to protect the at least one article.

17. The method of claim 16 wherein the SMF is at a temperature of about below or about above the T_g .

18. The method of claim 16 further comprising:
deforming or compressing the SMF structure in an original shape to
5 produce a compressed shape;
cooling the compressed shape to below the T_g to retain the compressed shape; and
raising the temperature of the compressed shape to above about the T_g to substantially regain the original shape,
10 whereby the original shape or the compressed shape conforms to at least a portion of the at least one article to protect the at least one article.

19. The method of claim 18 wherein the raising of the temperature of the SMF is accomplished by a process selected from the group consisting of convection heating, conductive heating, microwave heating, or chemical reaction.

15 20. The method of claim 18 wherein the cooling of the SMF is accomplished by a process selected from the group consisting of free convection, forced convection, refrigeration, conductive cooling, cooling baths, and liquid gas or nitrogen.

20 21. The method of claim 18 further comprising providing a plurality of SMF structures and a plurality of articles.

22. The method of claim 21 whereby the plurality of SMF structures are stackable for protecting the plurality of articles.

23. A method for producing a protective packaging, the method comprising:
25 providing a shape memory foam (SMF) structure having a glass transition temperature (T_g);
providing a transportation or storage container;

deforming or compressing the SMF structure to produce a compressed shape; and

placing the compressed shape in the transportation or storage container.

5 24. The method of claim 23 wherein the compressed shape is substantially flat.

 25. The method of claim 23 further comprising providing a plurality of SMF structures suitable for deforming or compressing into deformed
10 shapes for storing in the transportation or storage container.